



THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Linlin Xing et al. Confirmation No: 9090  
Serial No: 10/789,215  
Filed: 02/27/2004  
Examiner: Elizabeth M. Cole  
Art Unit: 1771  
Docket No: FDN-2829  
Customer No: 67750  
Title: FIBER MAT HAVING IMPROVED TENSILE STRENGTH AND  
PROCESS FOR MAKING SAME

MAIL STOP APPEAL BRIEF  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**AMENDED APPEAL BRIEF AND  
ONE MONTH EXTENSION OF TIME**

Dear Sir:

Pursuant to 37 C.F.R. §§ 41.31 and 41.37, attached herewith is appellants' Amended Appeal Brief submitted in response to the Notification of Non-Compliant Appeal Brief mailed on 07/16/2007. The Status of Claims section is amended to identify the claims involved in the appeal. Appellants hereby request a one (1) month extension of time for filing this amended brief. With the one (1) month extension of time, the amended brief is due 09/16/2007. Accordingly, this amended brief is being timely filed.

The Table of Contents begins on Page 2 of this paper and Appellants' Remarks begin on page 3.

## TABLE OF CONTENTS

REAL PARTY IN INTEREST .....	3
RELATED APPEALS AND INTERFERENCES .....	4
STATUS OF CLAIMS .....	5
STATUS OF AMENDMENTS .....	7
SUMMARY OF CLAIMED SUBJECT MATTER .....	8
GROUND OF REJECTION TO BE REVIEWED ON APPEAL .....	9
ARGUMENT .....	10
CLAIMS APPENDIX .....	13
EVIDENCE APPENDIX .....	15
RELATED PROCEEDINGS APPENDIX.....	16

**REAL PARTY IN INTEREST**

The inventors of the application at issue are Linlin Xing, Brian Duffy, William Bittle, Betty Roberts, and Chick Ford, who have assigned all of their rights to the application to Appellant, Building Materials Investment Corporation.

**RELATED APPEALS AND INTERFERENCES**

There are no related appeals or interferences known to Appellant, Appellant's legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in this pending Appeal.

**STATUS OF CLAIMS**

Claims 1-15, 21, and 22 are pending in the present Application and Claims 16-20 are cancelled. All pending claims were rejected in a Final Office Action dated August 16, 2006. The final rejection of all claims is appealed.

1. (rejected) A fiber mat for use in a building material, said mat comprising:  
a plurality of fibers;  
a resinous fiber binder, said fibers fixedly distributed in said binder; and  
a water-based urethane modifier wherein the weight ratio of said fiber binder to said urethane modifier is between about 200:1 to about 4:1.
2. (rejected) The fiber mat of Claim 1, wherein said urethane modifier comprises a polyurethane modifier.
3. (rejected) The fiber mat of Claim 2, wherein said polyurethane modifier is selected from the group consisting of: an aliphatic polyurethane, an aromatic polyurethane, and a hybrid polyurethane.
4. (rejected) The fiber mat of Claim 1, wherein said fiber binder comprises a formaldehyde type binder.
5. (rejected) The fiber mat of Claim 4, wherein said formaldehyde type binder is selected from the group consisting of: a urea/formaldehyde binder, a phenol/formaldehyde binder, and a melamine/formaldehyde binder.
6. (rejected) The fiber mat of Claim 1, wherein the weight ratio of said fiber binder to said urethane modifier is between about 99:1 to about 9:1.
7. (rejected) The fiber mat of Claim 1, said mat containing from about 55 wt.% to about 98 wt.% fiber and from about 0.05 wt.% to about 45 wt.% fiber binder.
8. (rejected) The fiber mat of Claim 1, wherein said fibers comprise glass fibers.

9. (rejected) The fiber mat of Claim 1, said mat containing from about 55 wt.% to about 98 wt.% glass fiber and from about 15 wt.% to about 30 wt.% fiber binder.

10. (rejected) The fiber mat of Claim 1, further comprising an asphalt coating on at least one surface of said mat, said mat having a tensile strength greater than about 1,000 psi.

11. (rejected) A fibrous mat roofing shingle, comprising:

a plurality of glass fibers; and

a fixative composition comprising a fiber binder and a water based polyurethane modifier wherein the weight ratio of said fiber binder to said polyurethane modifier is between about 200:1 to about 4:1,

wherein said fibers are fixedly distributed in said fixative composition.

12. (rejected) The fibrous mat of Claim 11, wherein the concentration of the fiber binder, based on the weight of the fibrous mat, is in the range of from about 0.05 wt.% and about 45 wt.%.

13. (rejected) The fibrous mat of Claim 11, wherein said glass fibers comprise a plurality of glass filaments having an average length of from about ¼ to about 3 inches and a diameter of from about 1 to about 50 microns.

14. (rejected) The fibrous mat of Claim 11, wherein the concentration of said glass filaments is between about 55 and about 98 wt.%.

15. (rejected) The fibrous mat of Claim 11, wherein said polyurethane modifier is selected from the group consisting of: an aliphatic polyurethane, an aromatic polyurethane, and a hybrid polyurethane.

16 - 20. (Cancelled).

21. (rejected) The fibrous mat of Claim 11, wherein the weight ratio of said fiber binder to said polyurethane modifier is between about 99:1 to about 9:1.

22. (rejected) The fibrous mat of Claim 1, wherein said water based urethane is a carboxylated polyurethane.

Serial No: 10/789,215  
Docket No: FDN-2829  
In Support of Notice of Appeal Dated 02/17/2007

**STATUS OF AMENDMENTS**

There have been no amendments filed subsequent to the August 16, 2006 Final Rejection.

**SUMMARY OF CLAIMED SUBJECT MATTER**

In summary, a first embodiment of the claimed subject matter as claimed in independent Claim 1 relates to a fiber mat for use in a building material. In view of the subject matter of the application, no drawings were thought necessary for the understanding of the invention, and as such, the following summary refers only to appropriate line, paragraph, and page numbers of the specification for understanding. The mat as recited in independent Claim 1 includes a plurality of fibers (paragraph [0008], line 6, page 3), a resinous fiber binder, where the fibers are fixedly distributed in the binder (paragraph [0008], lines 4-8, page 3), and a water-based urethane modifier (paragraphs [0008], lines 4-8, page 3), wherein the weight ratio of the fiber binder to the urethane modifier is between about 200:1 to about 4:1 (paragraph [0021], lines 14-15, page 6).

A second embodiment of the claimed subject matter is similar to the aforementioned first embodiment, however embodied as a roofing shingle. Independent Claim 11 relates to a fiber mat roofing shingle (see e.g., paragraph [0002], lines 11-12, page 1; paragraph [0012], lines 5-7, page 2; paragraph [0009], line 9, page 3). The roofing shingle includes a plurality of glass fibers (paragraph [0012], line 2, page 4), and a fixative composition comprising a fiber binder and a water based polyurethane modifier (paragraphs [0010], lines 14-18, page 3; paragraph [0022], lines 17-20, page 6); paragraph [0027], lines 13-17, page 8); see also paragraphs [0030-0032], and [0036]), wherein the weight ratio of said fiber binder to said polyurethane modifier is between about 200:1 to about 4:1, and wherein the fibers are fixedly distributed in the fixative composition.

Other embodiments of the invention are disclosed and claimed in dependent claims.



**GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

I. Whether the specification provides support for limitations in the claims, particularly independent claims 1 and 11 that the polyurethane modifier is water-based.

II. Whether Claims 1-15 and 21 are unpatentable over U.S. Patent No. 6,146,705 to Heine (hereinafter "Heine") in view of U.S. Patent No. 3,525,779 to Hawkins (hereinafter "Hawkins").

## ARGUMENT

I. The specification provides support for the limitation in the claims, particularly independent claims 1 and 11 that the polyurethane modifier is water-based.

In the July 31, 2006 Amendment, claims 1 and 11 were amended to further define exemplary embodiments of the present invention where the claimed urethane/polyurethane modifier was a water-based urethane/polyurethane modifier.

In the final Office Action dated August 16, 2006, the grounds of rejection state that the specification does not provide support for the limitation that the polyurethane modifier is water-based. In response to the August 2006 Office Action, Appellants respectively submitted that one of ordinary skill in the art would understand that a polyurethane modifier used, for example, in conjunction with an aqueous solution (paragraph [0010]), or aqueous mixture (paragraph [0022]) would be a water-based polyurethane. Also, paragraph [0027] describes blending the selected binder and the polyurethane modifier in water, and paragraphs [0030-0032] further describe the water-based polyurethane.

In a separate rejection, Appellants also submitted that paragraph [0036] discloses the use of a carboxylated polyurethane as recited in claim 21 in its disclosure of the aliphatic polyurethane elastomer.

Appellants note that neither of these issues were addressed in the January 8, 2007 Advisory Action, and respectfully request formal notification that the 35 U.S.C. §112 rejections have been withdrawn.

II. The combination of Heine and Hawkins does not render the claimed subject matter obvious.

Claims 1-15 and 21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,146,705 to Heine (hereinafter "Heine") in view of U.S. Patent No. 3,525,779 to Hawkins (hereinafter "Hawkins"). In the July 31, 2006

Amendment, Appellants argued that neither Heine nor Hawkins teach or suggest a fiber mat having a water-based urethane modifier as recited in independent claims 1 and 11. In particular, the urethane modifiers described by Hawkins are all solvent based polyurethanes and would be incompatible with Heine or the present invention, which describe aqueous based processes.

In this Office Action, the grounds of rejection state that Hawkins teaches adding a minor amount of a polyurethane modifier to a binder such as novolac resins which the grounds of rejection state are a type of formaldehyde resin, citing col. 3, lines 21-26, and that the addition of the urethane modifier promotes the adhesion of the resin with "various other components." As such, the grounds of rejection conclude that it would have been obvious to one of ordinary skill in the art at the time of invention to have added a minor amount of urethane binder to the binder of Heine with the expectation that this would enhance the bonding of the resin with various other components and substrates. Appellants respectfully traverse this rejection.

Appellants note that epoxies as disclosed in Hawkins are thermosetting resins that, in the uncured form, contain one or more reactive epoxide or oxirane groups. Novolac resins are a type of epoxy resin. The epoxide groups of thermosetting epoxy resins serve as cross-linking points in the subsequent curing step, in which the uncured epoxy is reacted with a curing agent or hardener. Cross-linking may be accomplished through the epoxide groups or through hydroxyl groups. As such, the use of the hydroxyl groups with the epoxy resins as discussed in Hawkins is typical of thermosetting epoxies. This typical thermosetting feature, therefore, would not suggest, as argued in the grounds of rejection, a broad conclusion that addition of a urethane modifier promotes the adhesion of a resin "with other components and substrates."

Further, this disclosure does not suggest use of a urethane modifier with the acrylic latex modifier used by Heine. As argued in the July 31, 2006 Amendment, Appellants maintain that the Hawkins and Heine systems are completely incompatible and the Hawkins polyurethanes would not be effective when combined with the resin in Heine. In addition, use of both a urethane modifier and another modifier would be

repetitive, and is not suggested by either reference, alone or in combination.

Accordingly, for these several reasons, reconsideration and withdrawal of the rejection is respectfully requested from the Board.

**CLAIMS APPENDIX**

1. A fiber mat for use in a building material, said mat comprising:  
a plurality of fibers;  
a resinous fiber binder, said fibers fixedly distributed in said binder; and  
a water-based urethane modifier wherein the weight ratio of said fiber binder to said urethane modifier is between about 200:1 to about 4:1.
2. The fiber mat of Claim 1, wherein said urethane modifier comprises a polyurethane modifier.
3. The fiber mat of Claim 2, wherein said polyurethane modifier is selected from the group consisting of: an aliphatic polyurethane, an aromatic polyurethane, and a hybrid polyurethane.
4. The fiber mat of Claim 1, wherein said fiber binder comprises a formaldehyde type binder.
5. The fiber mat of Claim 4, wherein said formaldehyde type binder is selected from the group consisting of: a urea/formaldehyde binder, a phenol/formaldehyde binder, and a melamine/formaldehyde binder.
6. The fiber mat of Claim 1, wherein the weight ratio of said fiber binder to said urethane modifier is between about 99:1 to about 9:1.
7. The fiber mat of Claim 1, said mat containing from about 55 wt.% to about 98 wt.% fiber and from about 0.05 wt.% to about 45 wt.% fiber binder.
8. The fiber mat of Claim 1, wherein said fibers comprise glass fibers.
9. The fiber mat of Claim 1, said mat containing from about 55 wt.% to about 98 wt.% glass fiber and from about 15 wt.% to about 30 wt.% fiber binder.
10. The fiber mat of Claim 1, further comprising an asphalt coating on at least one surface of said mat, said mat having a tensile strength greater than about 1,000 psi.

11. A fibrous mat roofing shingle, comprising:  
  
a plurality of glass fibers; and  
  
a fixative composition comprising a fiber binder and a water based polyurethane modifier wherein the weight ratio of said fiber binder to said polyurethane modifier is between about 200:1 to about 4:1,  
  
wherein said fibers are fixedly distributed in said fixative composition.
12. The fibrous mat of Claim 11, wherein the concentration of the fiber binder, based on the weight of the fibrous mat, is in the range of from about 0.05 wt.% and about 45 wt.%.
13. The fibrous mat of Claim 11, wherein said glass fibers comprise a plurality of glass filaments having an average length of from about ¼ to about 3 inches and a diameter of from about 1 to about 50 microns.
14. The fibrous mat of Claim 11, wherein the concentration of said glass filaments is between about 55 and about 98 wt.%.
15. The fibrous mat of Claim 11, wherein said polyurethane modifier is selected from the group consisting of: an aliphatic polyurethane, an aromatic polyurethane, and a hybrid polyurethane.
- 16 - 20. (Cancelled).
21. The fibrous mat of Claim 11, wherein the weight ratio of said fiber binder to said polyurethane modifier is between about 99:1 to about 9:1.
22. The fibrous mat of Claim 1, wherein said water based urethane is a carboxylated polyurethane.

**EVIDENCE APPENDIX**

Not applicable.

**RELATED PROCEEDINGS APPENDIX**

Not applicable.



In light of the above arguments, Appellant respectfully submits to the Board that the present rejections are untenable, and the Application is in condition for allowance.

The Commissioner is hereby authorized to charge \$950 (including \$500 for the Brief in Support of Appeal and \$450 for the two month extension of time) to Deposit Account No. 50-1855. Authorization is also given to charge any additional fees that may be required or credit any overpayments to Deposit Account No. 50-1855.

Respectfully requested,

Date: September 6, 2007



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